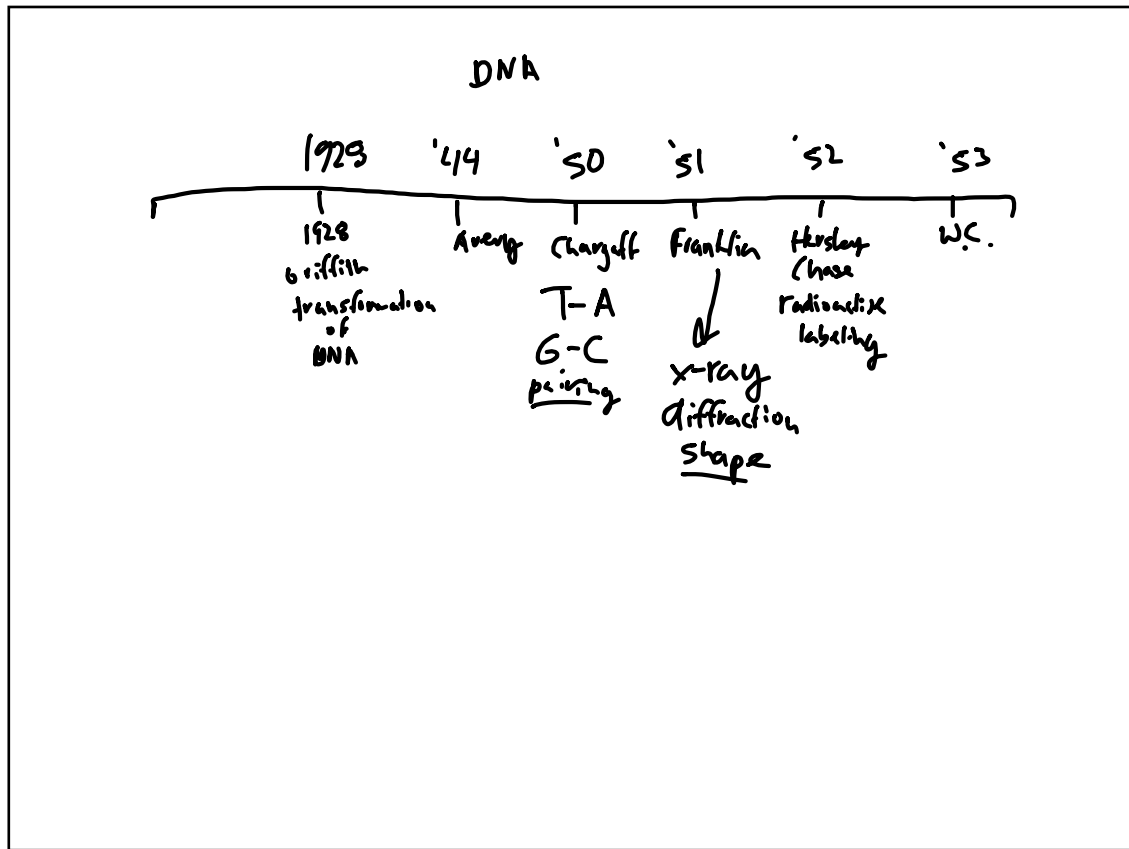


## Bellringer

- What is a gene?  
Segment of DNA
  - What is a protein?  
basic building blocks of all organisms
  - How do genes relate to proteins?  
DNA → RNA → <sup>(DNA)</sup> AA → proteins 20 amino acids
  - What is the shape of DNA?  
twisted ladder
  - Is eukaryotic DNA the same as prokaryotic DNA? Explain.
- NO
- Prokaryotes: Circular Plasmid floats freely in cytoplasm
- Eukaryotes: Chromatin
- protein  
histone

## Bellringer

- Write the RNA sequence for the following DNA sequence:
- TTATAGCAGGCCATCGAT  
AUG AAU AUC GU CCG GU AG CU A UAA ~~Protein~~
- Describe the process of transcription and translation.  
(nucleus) → cytoplasm free floating rougher
  - Describe 3 types of mutations:
- Anticodon: UUA, AAU
- Anticodon Codon: F, P, A
- substitution, insertion, deletion



• Rosalind Franklin  
   ↳ X-Ray  
 • Chargaff's Rule A-T G-C  
   ↳ Beltringer  
 • Hershey-Chase  
   ↳ DNA not protein is genetic material for heredity

→ Identify and discuss 3 experiments that shaped our current understanding of DNA.

• Watson & Crick → proposed model of DNA  
 • Griffith → mouse heat-killed w/ living bacteria = dead mouse

→ Simply state what the central dogma of Biology is ....  
 DNA → RNA → proteins → you  
     transcription                      translation

→ What is a mutation? Are they all bad? What causes them? Explain.  
 (substitution)  
 insertion, deletion, translocation

DNA RNA  
CGAT GCAU

Exit Ticket

Bio 4/17/15

→ What amino acids (building blocks of proteins) are produced from the following strand of DNA:

TAC CGA CAT TTA CAA ATC

→ In your own words describe how your genes (DNA) ends up determining what you look like and how your body functions. Hint: discuss central dogma, processes of transcription + translation.

# Intro to DNA/ RNA Review

Grade: 10th

Subject: Biology

Date:

1 The structure of DNA is described as a \_\_\_\_\_  
formed by two strands of nucleotides.

- A double helix
- B single spiral
- C polymerase chain
- D protein molecule

2 Which of the following is not a nitrogenous base in DNA nucleotides?

- A adenine
- B uracil
- C guanine
- D thymine

3 What did Hershey and Chase discover using radioactive labeling?

- A enzymes contain genetic material
- B DNA and proteins contain genetic materials
- C proteins contain genetic material
- ☒ D DNA contains genetic material


4 What technique was used in taking the first image of DNA structures?

- ☒ A x-ray diffraction
- B radioactive labeling
- C DNA tracking
- D chromosomal photography

5 The enzyme \_\_\_\_\_ catalyzes the addition of nucleotides to the DNA strand.

- A uracil
- B adenine
- C DNA polymerase
- D segmental ligase

polymerase  
many more enzyme  
DNA



6 What are small segments synthesized in the lagging strand of DNA?

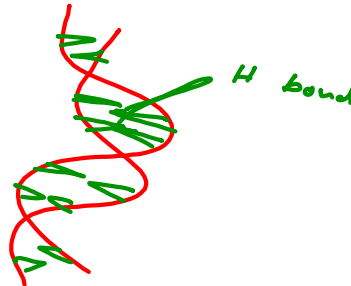
- A ligases
- B adenines
- C Okazaki fragments
- D helixes

Okazaki



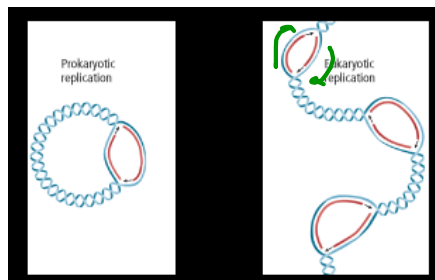
7 What type of bonds are broken during the unwinding stage of replication?

- A hydrogen in bases
- B hydrogen in polymerase
- C sulfur in ligase
- D carbon



8 What is the difference between DNA replication in eukaryotes and DNA replication in prokaryotes?

- A prokaryotes do not replicate DNA
- B Prokaryotic replication occurs at multiple origins
- C Eukaryotic replication occurs at multiple origins
- D Eukaryotic replication occurs only in one direction



9 Which of these is not an aspect of the central dogma of Biology?

- A DNA and RNA control protein synthesis
- B DNA codes for RNA
- C DNA and RNA are <sup>in</sup> living things
- D genetic material is found in protein

Bellringer

→ What is the central dogma of Biology?  
 $DNA \rightarrow RNA \rightarrow proteins$

→ Write the ~~RNA~~ sequence that corresponds to  
 $DNA = Thymine \quad RNA = Uracil$

[DNA] T A C G G A A T G C C A T G A G  
 A C U G C C U A A C G G U A C U C

→ What are three major types of mutations?  
 point, insertion, deletion, <sup>frameshift change</sup>

→ What is an "operon"? <sup>prokaryote</sup>

[A Adenine ]  
[T Thymine ]  
[C Cytosine ]  
[G Guanine ]

DNA  
 [30 bases]  
 RNA  
 AUG

Amino Acid Sequence  
 S T A  
 RNA  
 [C A U]

UUA



Chargaff's Rule

Bellinger

DNA  
A-T  
C-G

RNA  
A-U  
C-G

→ What was the significance of the "Hershey-Chase" experiment?  
transcription → translation

DNA → Explain the relationship between DNA + proteins.  
helicase → unzipping enzyme

→ What is the function of RNA polymerase? <sup>enzyme</sup>

→ What is an Okazaki fragment?

DNA replication on short segments of RNA  
lagging strand



DNA

A T G C

Cell has

37%

C → 37% G

Chargaff's

? % of A

13% A

13% T

$\frac{A+T}{=}$

$100 - 74 = 26$

# Genes to Proteins Review

Grade: 10th

Subject: Biology

Date: «date»

1 What is synthesized to pass the DNA code to the ribosome?

- A polymerase
- ☒ B messenger RNA
- C ligase
- D ribose

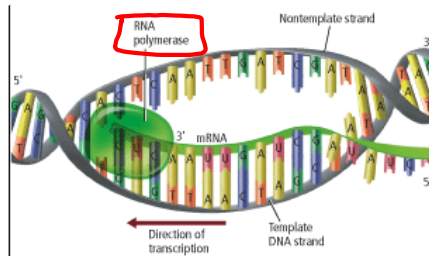
2 A process called \_\_\_\_\_ uses the code carried by the messenger RNA for protein synthesis.

- A translation
- B transcription
- C unwinding
- D elongation

3 The base-pair of DNA or messenger RNA is called a \_\_\_\_\_.

- A polymerase chain
- B translation
- C codon
- D transfer RNA

4 Which substance shown here, binds to the site where messenger RNA will be synthesized?



5 What controls differentiation to determine the organism's body plan?

- A lac operon
- B protein complex
- C polymerase
- D hox genes

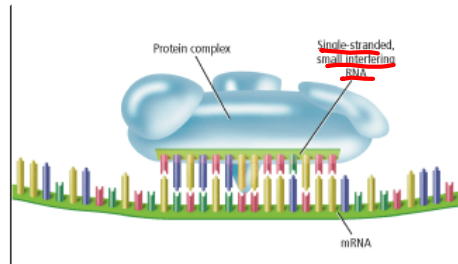
6 What eukaryotic gene regulation is shown here?

A RNA interference

B lac operon

C trp operon

D mutation



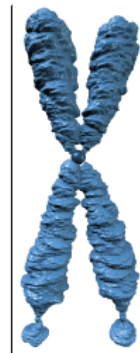
7 The mutation shown here causes \_\_\_\_\_.

A nucleotide syndrome

B fragile X syndrome

C abnormally high intelligence

D replication disease

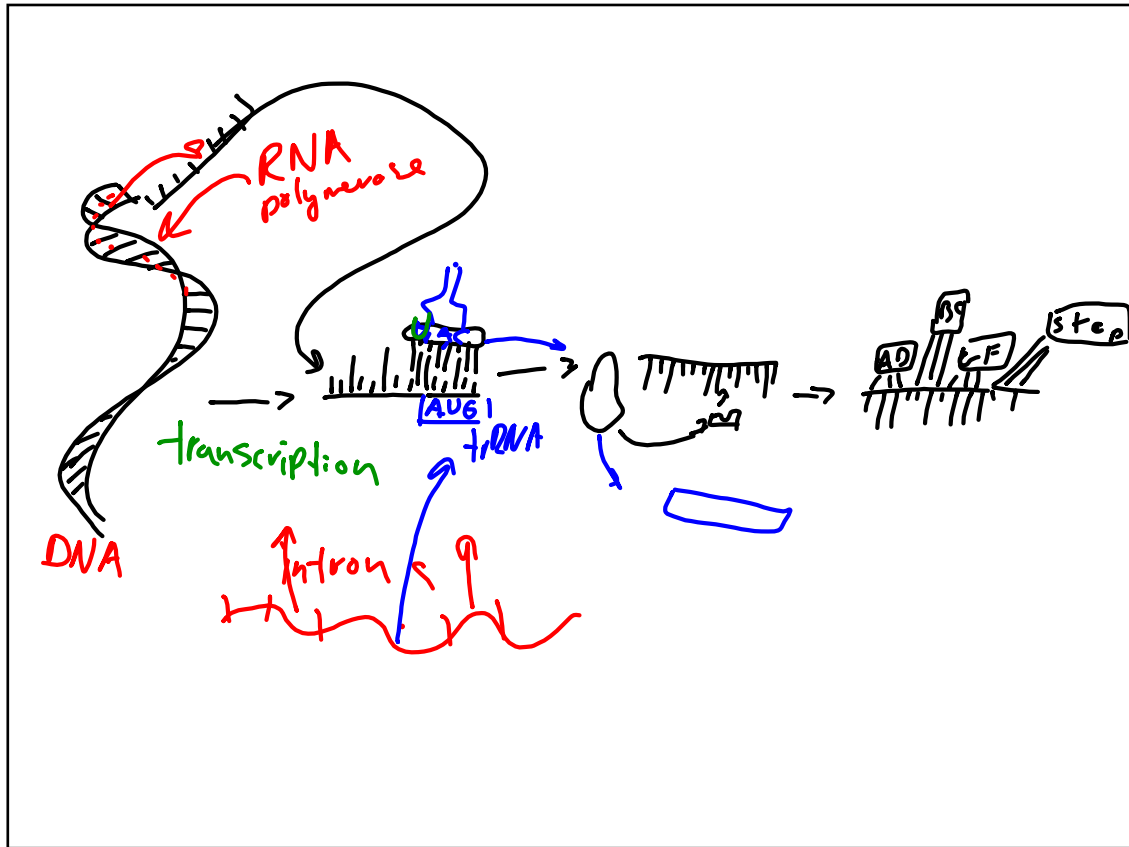


8 A(n) \_\_\_\_\_ often controls the transcription of prokaryotic genes.

- A hox gene
- B interfering RNA
- C operon
- D protein complex

9 Which of these is not a function of transcription factors?

- A control rate of transcription
  - B ensure gene is used at right time
  - C stabilizing binding of RNA polymerase
  - D prevent messenger RNA from translating
- help transcription occur*



# Genes to Proteins

Grade: «grade»

Subject: «subject»

Date: «date»

1 A(n) \_\_\_\_\_ is involved with the regulation of a prokaryotic genome.

operon

2 Changes in a DNA sequence is called a mutation.

True

False



3 Which demonstrates an insertion mutation of 5' GGGCCCAA 3'?

- A 5' GGGGCCCAA 3'
- B 5' GGGCCCAA 3'
- C 5' GGGAAACCC 3'
- D 5' GGGCCCAAAAAA 3'

4 Which is not a type of a mutation?

- A base substitution
- B insertions
- C RNA interference
- D translocation

5 Which is true about eukaryotic gene regulation?

- A eukaryotic gene regulation is exactly like prokaryotic gene regulation
- B Replication factors guide the binding of eukaryotic RNA polymerase to the promoter
- ☒ C activator proteins fold DNA to enhancer sites that increase the rate of gene transmission
- ☐ D repressor proteins bind to activators, preventing them from binding to the DNA

*prokaryotic*

6 Which correctly lists the changes to eukaryotic pre-mRNA to form mRNA?

- A cap added, introns <sup>removed</sup> excised, and poly T tail added
- B cap added, exons excised, and poly T tail added
- ☒ C cap added, introns excised, and poly A tail added
- D cap added, exons excised, and poly A tail added

*AAAAAAAA*

7 A nucleosome consists of DNA wrapped around the histone proteins.

True

False

8 What are the basic building blocks of DNA and RNA?

A ribose

B purines

C nucleotides

D phosphorus

9 If a section of DNA has 27 % thymine, how much cytosine will it have?

- A 23 %
- B 27 %
- C 46 %
- D 54 %

A-T  
G-C

$$2x + 2y = 1$$

$$2(.27) + 2y = 1 \quad y = .23$$

$$\begin{array}{r} .54 + 2y = 1 \\ -.54 \quad \quad - .54 \\ \hline 2y = .46 \\ \hline y = .23 \end{array}$$

10 Okazaki fragments are short fragments of new DNA produced during the replication of the lagging strand of DNA.